CLAIMS

What is claimed is:

1. A method for coding macroblock video data according to layered coding techniques in which the macroblock video data is represented as multi-layered frames, each frame having a plurality of references in multiple layers ranging from a base layer of low quality to enhancement layers of increasingly higher quality, wherein the method uses a coding mode to select a reference to be used for prediction and reconstruction at each macroblock of video data, the method comprising the steps of:

encoding macroblocks to produce a first bitstream representing a base layer;

encoding macroblocks to produce a second bitstream representing one or more enhancement layers using an INTER coding mode selected from the group consisting of:

an LPLR coding mode that encodes macroblocks to produce the second bitstream by a prediction from a low quality reference in a previous frame, wherein a high quality reference of the current frame is reconstructed from the low quality reference in the previous frame;

an HPHR coding mode that encodes macroblocks to produce the second bitstream by a prediction from a high quality reference in a previous frame, wherein the high quality reference in the previous frame is used to reconstruct a high quality reference in the current frame; and

an HPLR coding mode that encodes macroblocks to produce the second bitstream by a prediction from a high quality reference in a previous frame, wherein:

a high quality reference of the current frame is reconstructed from a low quality reference in the previous frame; and

the high quality reference in the previous frame is not the same as the low quality reference in the previous frame.

2. The method as set forth in Claim 1, wherein:

encoding macroblocks to produce the first and second bitstreams further comprises estimating drifting information that occurs from the encoding; and

the INTER coding mode is selected from the group based upon a derivation that uses the estimated drifting information to maximize coding efficiency while minimizing drifting error.

3. The method as set forth in Claim 1, wherein:

encoding macroblocks to produce a first bitstream representing a base layer comprises motion compensating an original image using the base layer as a reference to form a low quality predicted image in the pixel domain x_b;

encoding macroblocks to produce a second bitstream representing one or more enhancement layers using an INTER coding mode further comprises motion compensating an original image using the enhancement layer as a reference to form a high quality predicted image in the pixel domain x_e;

transforming the low quality predicted image in the pixel domain x_b to form low quality predicted coefficients X_b;

quantizing the low quality predicted coefficients to form quantized coefficients;

dequantizing the quantized coefficients to form dequantized coefficients $\widetilde{X}_b$;

inverse transforming the dequantized coefficients $\widetilde{X}_b$ to form inverse dequantized coefficients as a reconstructed base layer in pixel the domain $\widetilde{x}_b$;

taking the absolute value of the difference between $\widetilde{x}_b$ and:

the base layer of the motion compensated original image in the pixel domain x_b to form a first value; and

the high quality predicted image in the pixel domain x_e to form a second value;

selecting the LPLR mode when the first value less than or equal to the second value; and

selecting the HPLR mode or the HPHR mode when the first value greater then the second value.

4. A method as recited in Claim 1, further comprising:

using variable length coding to compress the first and second bitstreams;

transmitting the compressed first and second bitstreams over a network;

decompressing and decoding the first bitstream representing the base layer into the video data; and

decompressing and decoding the second bitstream representing one or more enhancement layers into the video data.

5. A method as recited in Claim 4, further comprising reconstructing a missing enhancement layer from one of the high and low high quality references in the previous frame.

6. The method as defined in Claim 1, wherein the layered coding techniques comprise a Progressive Fine Granularity Scalable (PFGS) video coding.

7. A method for coding macroblock video data according to layered coding techniques in which the macroblock video data is represented as multi-layered frames, each frame having a plurality of references in multiple layers ranging from a base layer of low quality to enhancement layers of increasingly higher quality, the method comprising the steps of:

motion compensating an original image using the base layer as a reference to form a low quality predicted image;

transforming the low quality predicted image to form low quality predicted coefficients;

quantizing the low quality predicted coefficients to form quantized coefficients;

dequantizing the quantized coefficients to form dequantized coefficients;

inverse transforming the dequantized coefficients to form inverse dequantized coefficients in the form of a reconstructed base layer in pixel the domain $\tilde{x}_b$;

taking the absolute value of the difference between $\tilde{x}_b$ and:

the base layer of the motion compensated original image in the pixel domain x_b to form a first value; and

one said enhancement layer of the motion compensated original image in the pixel domain x_e to form a second value;

selecting the LPLR mode when the first value less than or equal to the second value; and

selecting the HPLR mode or the HPHR mode when the first value greater then the second value.

8. The method as defined in Claim 7, wherein the layered coding techniques comprise a Progressive Fine Granularity Scalable (PFGS) video coding.

9. A computer-readable medium having computer-executable instructions, which when executed on a processor, direct a computer to perform the steps of Claim 7.

10. A computer-readable medium having computer-executable instructions, which when executed on a processor, direct a computer to:

encode macroblocks of video data according to layered coding techniques in which the macroblock video data is represented as multi-layered frames, each frame having a plurality of references in multiple layers ranging from a base layer of low quality to enhancement layers of increasingly higher quality, including encoding macroblocks to produce a first bitstream representing a base layer, and encoding macroblocks to produce a second bitstream representing one or more enhancement layers using an INTER coding mode selected from the group consisting of:

an LPLR coding mode that encodes macroblocks to produce the second bitstream by a prediction from a low quality reference in a previous frame, wherein a high quality reference of the current frame is reconstructed from the low quality reference in the previous frame;

an HPHR coding mode that encodes macroblocks to produce the second bitstream by a prediction from a high quality reference in a previous frame, wherein the high quality reference in the previous frame is used to reconstruct a high quality reference in the current frame; and

an HPLR coding mode that encodes macroblocks to produce the second bitstream by a prediction from a high quality reference in a previous frame, wherein:

a high quality reference of the current frame is reconstructed from a low quality reference in the previous frame; and

the high quality reference in the previous frame is not the same as the low quality reference in the previous frame.

11. A computer-readable medium as recited in claim 10, further having instructions that direct a computer to store the base layer and the one or more enhancement layers in memory.

12. A computer-readable medium as recited in claim 10, further having instructions that direct a computer to:

transmit the base layer over a network; and

transmit the one or more enhancement layers over the network according to bandwidth availability on the network.

13. A computer-readable medium as recited in claim 10, further having instructions that direct a computer to recover the video data from the base layer and any of the one or more enhancement layers.

14. A computer-readable medium as recited in claim 10, further having instructions that direct a computer to reconstruct a missing enhancement layer from an enhancement layer of a reference reconstructed frame.

15. A video coding system to encode macroblocks of video data according to layered coding techniques in which the macroblock video data is represented as multi-layered frames, each frame having a plurality of references in multiple layers ranging from a base layer of low quality to enhancement layers of increasingly higher quality, the video coding system comprising:

a base layer encoder to encode macroblocks to produce a first bitstream representing a base layer; and

an enhancement layer encoder to encode macroblocks to produce a second bitstream representing one or more enhancement layers using an INTER coding mode selected from the group consisting of:

an LPLR coding mode that encodes macroblocks to produce the second bitstream by a prediction from a low quality reference in a previous frame, wherein a high quality reference of the current frame is reconstructed from the low quality reference in the previous frame;

an HPHR coding mode that encodes macroblocks to produce the second bitstream by a prediction from a high quality reference in a previous frame, wherein

the high quality reference in the previous frame is used to reconstruct a high quality reference in the current frame; and

an HPLR coding mode that encodes macroblocks to produce the second bitstream by a prediction from a high quality reference in a previous frame, wherein:

a high quality reference of the current frame is reconstructed from a low quality reference in the previous frame; and

the high quality reference in the previous frame is not the same as the low quality reference in the previous frame.

16. An operating system comprising the video coding system of claim 15.

17. A video coding system for encoding macroblocks of video data according to layered coding techniques in which the macroblock video data is represented as multi-layered frames, each frame having a plurality of references in multiple layers ranging from a base layer of low quality to enhancement layers of increasingly higher quality, the video coding system comprising:

means for encoding macroblocks to produce a first bitstream representing a base layer; and

means for encoding macroblocks to produce a second bitstream representing one or more enhancement layers using an INTER coding mode selected from the group consisting of:

an LPLR coding mode that encodes macroblocks to produce the second bitstream by a prediction from a low quality reference in a previous frame, wherein a high quality reference of the current frame is reconstructed from the low quality reference in the previous frame;

an HPHR coding mode that encodes macroblocks to produce the second bitstream by a prediction from a high quality reference in a previous frame, wherein the high quality reference in the previous frame is used to reconstruct a high quality reference in the current frame; and

an HPLR coding mode that encodes macroblocks to produce the second bitstream by a prediction from a high quality reference in a previous frame, wherein:

a high quality reference of the current frame is reconstructed from a low quality reference in the previous frame; and

the high quality reference in the previous frame is not the same as the low quality reference in the previous frame.

18. An operating system comprising the video coding system of claim 17.

19. A video delivery architecture, comprising:

a content provider having a video storage to store video data, a video server to serve the video data over a network, a base layer encoder, and an enhancement layer encoder, the video server being configured to encode macroblocks of video data according to layered coding techniques in which the macroblock video data is represented as multi-layered frames, each frame having a plurality of references in multiple layers ranging from a base layer of low quality to enhancement layers of increasingly higher quality, wherein:

the base layer encoder encodes macroblocks to produce a first bitstream representing a base layer; and

the enhancement layer encoder encodes macroblocks to produce a second bitstream representing one or more enhancement layers using an INTER coding mode selected from the group consisting of:

an LPLR coding mode that encodes macroblocks to produce the second bitstream by a prediction from a low quality reference in a previous frame, wherein a high quality reference of the current frame is reconstructed from the low quality reference in the previous frame;

an HPHR coding mode that encodes macroblocks to produce the second bitstream by a prediction from a high quality reference in a previous frame, wherein the high quality reference in the previous frame is used to reconstruct a high quality reference in the current frame; and

an HPLR coding mode that encodes macroblocks to produce the second bitstream by a prediction from a high quality reference in a previous frame, wherein:

a high quality reference of the current frame is reconstructed from a low quality reference in the previous frame; and

the high quality reference in the previous frame is not the same as the low quality reference in the previous frame;

a client configured to receive the encoded video data served from the content provider, the client being configured to decode the video data.

20. A video delivery architecture as recited in claim 19, wherein:

the video server transmits the encoded video data as composing the base layer and the one or more of the enhancement layers; and

the client decodes the video data from the base layer and the one or more enhancement layers.

21. A video delivery architecture as recited in claim 19, wherein the client reconstructs an enhancement layer in a particular frame from an enhancement layer of a reference reconstructed frame.

22. A method for coding macroblock video data according to layered coding techniques in which the macroblock video data is represented as multi-layered frames, each frame having a plurality of references in multiple layers ranging from a base layer of low quality to enhancement layers of increasingly higher quality, wherein the method uses a coding mode to select a reference to be used for prediction and reconstruction both at the base layer and at the enhancement layer, the method comprising:

encoding macroblocks to produce a first bitstream representing a base layer;

encoding macroblocks to produce a second bitstream representing one or more enhancement layers using an INTER coding mode selected from the group consisting of:

a BHPLR coding mode that encodes macroblocks to produce the second bitstream by a prediction from a high quality reference in a previous frame, wherein:

a low quality reference of the current frame is reconstructed from, and is of the same quality as, a low quality reference in the previous frame; and

a high quality reference of the current frame is reconstructed from, and is of the same quality as, the high quality reference in the previous frame;

a BHPHR coding mode that encodes macroblocks to produce the second bitstream by a prediction from a high quality reference in a previous frame, wherein:

a low quality reference of the current frame is reconstructed from the high quality reference in the previous frame; and

a high quality reference of the current frame is reconstructed from, and is of the same quality as, the high quality reference in the previous frame.

23. A computer-readable medium having computer-executable instructions, which when executed on a processor, direct a computer to perform the steps of Claim 22.

24. The method as defined in Claim 22, wherein the layered coding techniques comprise a Progressive Fine Granularity Scalable (PFGS) video coding.

25. A video delivery architecture, comprising:

a content provider having a video storage to store video data, a video server to serve the video data over a network, a base layer encoder, and an enhancement layer encoder, the video server being configured to encode macroblocks of video data according to layered coding techniques in which the macroblock video data is represented as multi-layered frames, each frame having a plurality of references in multiple layers ranging from a base layer of low quality to enhancement layers of increasingly higher quality, wherein:

the base layer encoder encodes macroblocks to produce a first bitstream representing a base layer; and

the enhancement layer encoder encodes macroblocks to produce a second bitstream representing one or more enhancement layers using an INTER coding mode selected from the group consisting of:

a BHPLR coding mode that encodes macroblocks to produce the second bitstream by a prediction from a high quality reference in a previous frame, wherein:

a low quality reference of the current frame is reconstructed from, and is of the same quality as, a low quality reference in the previous frame; and

a high quality reference of the current frame is reconstructed from, and is of the same quality as, the high quality reference in the previous frame;

a BHPHR coding mode that encodes macroblocks to produce the second bitstream by a prediction from a high quality reference in a previous frame, wherein:

a low quality reference of the current frame is reconstructed from the high quality reference in the previous frame; and

a high quality reference of the current frame is reconstructed from, and is of the same quality as, the high quality reference in the previous frame;

a client configured to receive the encoded video data served from the content provider, the client being configured to decode the video data.

26. A video delivery architecture as recited in claim 25, wherein:

the video server transmits the encoded video data as composing the base layer and the one or more of the enhancement layers; and

the client decodes the video data from the base layer and the one or more enhancement layers.

27. A video delivery architecture as recited in claim 25, wherein the client reconstructs an enhancement layer in a particular frame from an enhancement layer of a reference reconstructed frame.

28. A method for coding macroblock video data according to layered coding techniques in which the macroblock video data is represented as multi-layered frames in multiple layers ranging from a base layer of low quality to enhancement layers of increasingly higher quality, the frames including frames *n-1, n, and n+1*, wherein frames *n-1* and *n+1* have a plurality of references, and wherein the method uses a coding mode to select a reference to be used for prediction and reconstruction both in a backward direction in the frames and in a forward direction in the frames, the method comprising:

encoding macroblocks to produce a first bitstream representing a base layer;

encoding macroblocks to produce a second bitstream representing one or more enhancement layers using an INTER coding mode selected from the group consisting of:

a first coding mode that encodes macroblocks to produce the second bitstream for the *n* frame by temporal predictions from both a low quality reference in the *n-1* frame and a low quality reference in the *n+1* frame;

a second coding mode that encodes macroblocks to produce the second bitstream for the *n* frame by temporal predictions from:

a low quality reference in the *n-1* frame;

a low quality reference in the *n+1* frame;

a high quality reference in the *n-1* frame; and

a high quality reference in the *n+1* frame;

wherein the low quality references in the *n-1* and *n+1* frames are used to predict only the lowest quality enhancement layer in the *n* frame;

a third coding mode that encodes macroblocks to produce the second bitstream for the *n* frame by temporal predictions from:

a high quality reference in the *n-1* frame; and

a high quality reference in the *n+1* frame.

29. A computer-readable medium having computer-executable instructions, which when executed on a processor, direct a computer to perform the steps of Claim 28.

30. The method as defined in Claim 28, wherein the layered coding techniques comprise a Progressive Fine Granularity Scalable (PFGS) video coding.

31. A video delivery architecture, comprising:

a content provider having a video storage to store video data, a video server to serve the video data over a network, a base layer encoder, and an enhancement layer encoder, the video server being configured to encode macroblocks of video data according to layered coding techniques in which the macroblock video data is represented as multi-layered frames, each frame having a plurality of references in multiple layers ranging from a base layer of low quality to enhancement layers of increasingly higher quality, the frames including frames *n-1, n, and n+1*, wherein frames *n-1* and *n+1* have a plurality of references, wherein:

the base layer encoder encodes macroblocks to produce a first bitstream representing a base layer; and

the enhancement layer encoder encodes macroblocks to produce a second bitstream representing one or more enhancement layers using an INTER coding mode selected from the group consisting of:

a first coding mode that encodes macroblocks to produce the second bitstream for the *n* frame by temporal predictions from both a low quality reference in the *n-1* frame and a low quality reference in the *n+1* frame;

a second coding mode that encodes macroblocks to produce the second bitstream for the *n* frame by temporal predictions from:

a low quality reference in the *n-1* frame;

a low quality reference in the *n+1* frame;

a high quality reference in the *n-1* frame; and

a high quality reference in the *n+1* frame;

wherein the low quality references in the *n-1* and *n+1* frames are used to predict only the lowest quality enhancement layer in the *n* frame;

a third coding mode that encodes macroblocks to produce the second bitstream for the *n* frame by temporal predictions from:

a high quality reference in the *n-1* frame; and

a high quality reference in the *n+1* frame;

a client configured to receive the encoded video data served from the content provider, the client being configured to decode the video data.

32. A video delivery architecture as recited in claim 31, wherein:

the video server transmits the encoded video data as composing the base layer and the one or more of the enhancement layers; and

the client decodes the video data from the base layer and the one or more enhancement layers.

33. A video delivery architecture as recited in claim 31, wherein the client reconstructs an enhancement layer in a particular frame from an enhancement layer of a reference reconstructed frame.

34. A method for coding macroblock video data according to layered coding techniques in which the macroblock video data is represented as multi-layered frames, each frame having a plurality of references in multiple layers ranging from a base layer of low quality to enhancement layers of increasingly higher quality, the method comprising:

encoding macroblocks to produce a first bitstream representing a base layer;

encoding macroblocks to produce a second bitstream representing a plurality of high resolution enhancement layers and a plurality of low resolution enhancement layers using an INTER coding mode selected from the group consisting of:

a first coding mode that encodes macroblocks to produce the second bitstream having high and low resolution components in a current frame, wherein:

both the low and high resolution components are predicted in the temporal domain from a low quality, low resolution reference in a previous frame; and

a high resolution, high quality reference in the current frame is reconstructed from the low quality, low resolution reference in the previous frame;

a second coding mode that encodes macroblocks to produce the second bitstream having high and low resolution components in a current frame, wherein:

the low resolution components are predicted in the temporal domain from a low quality, low resolution reference in a previous frame;

the high resolution components are predicted in the temporal domain from a high quality, high resolution reference of the previous frame; and

a high resolution, high quality reference in the current frame is reconstructed from, and is of the same quality as, the high quality, high resolution reference in the previous frame;

a third coding mode that encodes macroblocks to produce the second bitstream having high and low resolution components in a current frame, wherein:

one said low resolution enhancement layer predicts another said low resolution enhancement layer of higher quality in the transform domain;

one said high resolution enhancement layer predicts another said high resolution enhancement layer of higher quality in the transform domain;

one said low resolution enhancement layer predicts in the transform domain one said high resolution enhancement layer;

a high resolution, high quality reference in the current frame is reconstructed from the low quality, low resolution reference in the previous frame;

a fourth coding mode that encodes macroblocks to produce the second bitstream having high and low resolution components in a current frame, wherein:

the one or more enhancement layers include a plurality of high resolution enhancement layers and a plurality of low resolution enhancement layers;

one said low resolution enhancement layer predicts another said low resolution enhancement layer of higher quality in the transform domain;

one said high resolution enhancement layer predicts another said high resolution enhancement layer of higher quality in the transform domain;

the high resolution enhancement layers are not predicted in the transform domain from the low resolution enhancement layers;

the low resolution components are predicted in the temporal domain from a low quality, low resolution reference in a previous frame;

the high resolution components are predicted in the temporal domain from a high quality, high resolution reference of the previous frame; and

a high resolution, high quality reference in the current frame is reconstructed from, and is of the same quality as, the high quality, high resolution reference in the previous frame;

a fifth coding mode that encodes macroblocks to produce the second bitstream having high and low resolution components in a current frame, wherein:

the one or more enhancement layers include a plurality of high resolution enhancement layers and a plurality of low resolution enhancement layers;

one said low resolution enhancement layer predicts another said low resolution enhancement layer of higher quality in the transform domain;

one said high resolution enhancement layer predicts another said high resolution enhancement layer of higher quality in the transform domain;

the high resolution enhancement layers are not predicted in the transform domain from the low resolution enhancement layers;

the low resolution components are predicted in the temporal domain from a low quality, low resolution reference in a previous frame;

the high resolution components are predicted in the temporal domain from a high quality, high resolution reference of the previous frame; and

a high resolution, high quality reference in a current frame is reconstructed from the low quality, low resolution reference in the previous frame;

a sixth coding mode that encodes macroblocks to produce the second bitstream having high and low resolution components in a current frame, wherein:

both of the low and high resolution components are predicted in the temporal domain in the temporal domain from a high quality, high resolution reference in a previous frame; and

a low resolution, low quality reference in the current frame is reconstructed from a low quality, low resolution reference in the previous frame;

a seventh coding mode that encodes macroblocks to produce the second bitstream having high and low resolution components in a current frame, wherein:

both of the low and high resolution components are predicted in the temporal domain from a high quality, high resolution reference in a previous frame; and

a high resolution, high quality reference in the current frame is reconstructed from the high quality, high resolution reference in the previous frame.

35. A computer-readable medium having computer-executable instructions, which when executed on a processor, direct a computer to perform the steps of Claim 34.

36. The method as defined in Claim 34, wherein the layered coding techniques comprise a Progressive Fine Granularity Scalable (PFGS) video coding.

37. A method for coding macroblock video data according to layered coding techniques in which the macroblock video data is represented as multi-layered frames in multiple layers ranging from a base layer of low quality to enhancement layers of increasingly higher quality, the frames including frames *n-1, n, and n+1*, wherein frames *n-1* and *n+1* have a plurality of references, the method comprising:

encoding macroblocks to produce a first bitstream representing a base layer;

encoding macroblocks to produce a second bitstream representing a plurality of high resolution enhancement layers and a plurality of low resolution enhancement layers using an INTER coding mode selected from the group consisting of:

a first coding mode that encodes macroblocks to produce the second bitstream having high and low resolution components in the *n* frame, wherein both the low and high resolution components in the *n* frame are predicted in the temporal domain from a low quality, low resolution reference in each of the *n-1* and *n+1* frames;

a second coding mode that encodes macroblocks to produce the second bitstream having high and low resolution components for the *n* frame by temporal predictions from:

a low quality, low resolution reference in each of the *n-1* and *n+1* frames to produce low quality, low resolution components in *n* frame; and

a high quality, high resolution reference in each of the *n-1* and *n+1* frames to produce high quality, high resolution components in *n* frame;

wherein one said low resolution, low quality component in the *n* frame is used for prediction in the transform domain of one said high quality, high resolution component in *n* frame;

a third coding mode that encodes macroblocks to produce the second bitstream having high and low resolution components for the *n* frame by temporal predictions from:

a low quality, low resolution reference in each of the *n-1* and *n+1* frames to produce low quality, low resolution components in *n* frame; and

a high quality, high resolution reference in each of the *n-1* and *n+1* frames to produce high quality, high resolution components in *n* frame;

wherein the low resolution, low quality components in the *n* frame are not used for prediction in the transform domain of the high quality, high resolution components in *n* frame.

38. A computer-readable medium having computer-executable instructions, which when executed on a processor, direct a computer to perform the steps of Claim 37.

39. The method as defined in Claim 37, wherein the layered coding techniques comprise a Progressive Fine Granularity Scalable (PFGS) video coding.

40. A video delivery architecture, comprising:

a content provider having a video storage to store video data, a video server to serve the video data over a network, a base layer encoder, and an enhancement layer encoder, the video server being configured to encode macroblocks of video data according to layered

coding techniques in which the macroblock video data is represented as multi-layered frames, each frame having a plurality of references in multiple layers ranging from a base layer of low quality to enhancement layers of increasingly higher quality, the frames including frames *n-1, n, and n+1*, wherein frames *n-1* and *n+1* have a plurality of references, wherein:

the base layer encoder encodes macroblocks to produce a first bitstream representing a base layer; and

the enhancement layer encoder encodes macroblocks to produce a second bitstream representing a plurality of high resolution enhancement layers and a plurality of low resolution enhancement layers using an INTER coding mode selected from the group consisting of:

a first coding mode that encodes macroblocks to produce the second bitstream having high and low resolution components in the *n* frame, wherein both the low and high resolution components in the *n* frame are predicted in the temporal domain from a low quality, low resolution reference in each of the *n-1* and *n+1* frames;

a second coding mode that encodes macroblocks to produce the second bitstream having high and low resolution components for the *n* frame by temporal predictions from:

a low quality, low resolution reference in each of the *n-1* and *n+1* frames to produce low quality, low resolution components in *n* frame; and

a high quality, high resolution reference in each of the *n-1* and *n+1* frames to produce high quality, high resolution components in *n* frame;

wherein one said low resolution, low quality component in the *n* frame is used for prediction in the transform domain of one said high quality, high resolution component in *n* frame;

a third coding mode that encodes macroblocks to produce the second bitstream having high and low resolution components for the *n* frame by temporal predictions from:

a low quality, low resolution reference in each of the *n-1* and *n+1* frames to produce low quality, low resolution components in *n* frame; and

a high quality, high resolution reference in each of the *n-1* and *n+1* frames to produce high quality, high resolution components in *n* frame;

wherein the low resolution, low quality components in the *n* frame are not used for prediction in the transform domain of the high quality, high resolution components in *n* frame;

a client configured to receive the encoded video data served from the content provider, the client being configured to decode the video data.

41. A video delivery architecture as recited in claim 40, wherein:

the video server transmits the encoded video data as composing the base layer and the one or more of the enhancement layers; and

the client decodes the video data from the base layer and the one or more enhancement layers.

42. A video delivery architecture as recited in claim 40, wherein the client reconstructs an enhancement layer in a particular frame from an enhancement layer of a reference reconstructed frame.